LA-UR 01-10

TRANSIMS Data

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LOS ALAMOS
NATIONAL LABORATORY

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Tables

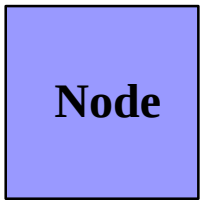
- Nodes
- Links
- Pocket Lanes
- Parking Locations
- Transit
- Signs
- Signals/Phases
- Activity Locations
- Process Links
- Connectivity
- Each module uses some or all of the network tables
- The network tables allow for models of special features

Tables - Interdependencies

Table	Tables on which it depends
Link	Node
Speed	Node, Link, Pocket Lane
Pocket Lane	Node, Link
Lane Use	Node, Link, Pocket Lane
Parking	Node, Link
Barrier	Node, Link, Pocket Lane
Transit Stop	Node, Link
Lane Connectivity	Node, Link, Pocket Lane
Turn Prohibition	Node, Link, Pocket Lane
Unsignalized Node	Node, Link, Pocket Lane
Signalized Node	Node, Timing Plan
Phasing Plan	Node, Link, Pocket Lane, Timing Plan
Detector	Node, Link, Pocket Lane
Signal Coordinator	Node, Signalized Node
Activity Location	Node, Link
Process Link	Parking, Transit Stop, Activity Location
Study Area Link	Link

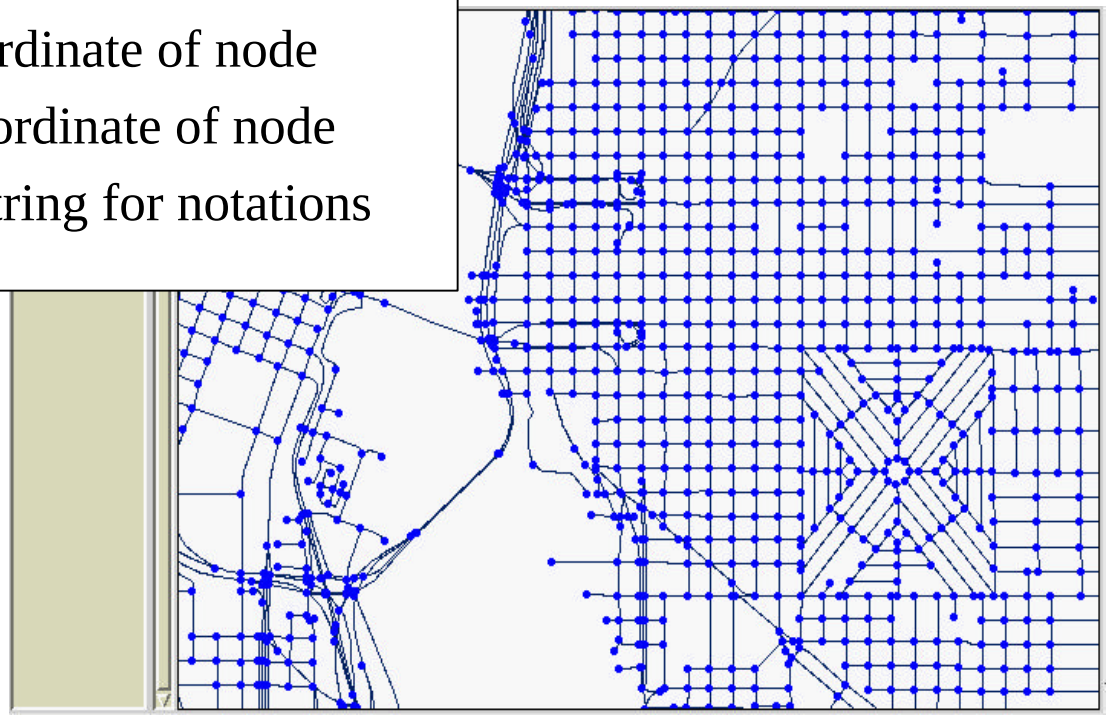
Nodes

- **A point in three-dimensional space**
- **UTM projection**
- **Provides the X, Y, Z coordinates for all features (links, pocket lanes, activities, etc.)**
- **Anchor for all link segments**
- **Does not represent intersections**
- **Portland: ~ 101,000 nodes**



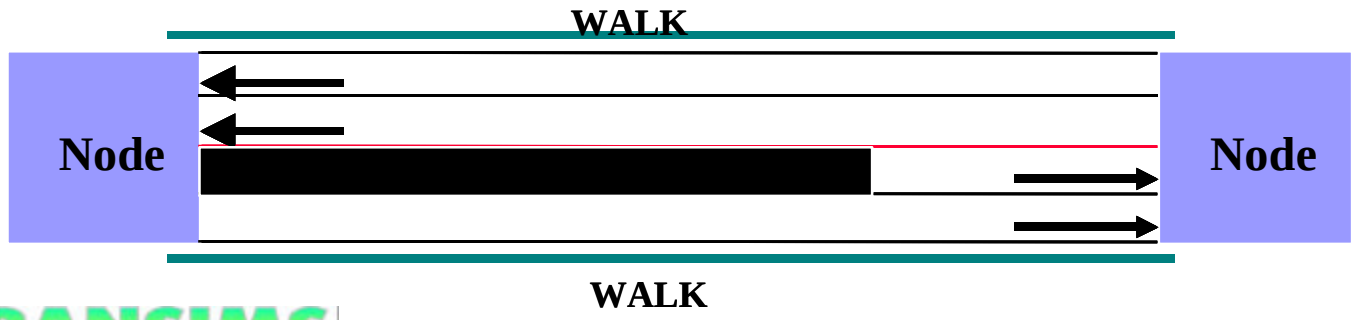
Nodes

- **Table fields**
  - **ID**: Node id
  - **EASTING**: X-coordinate of node
  - **NORTHING**: Y-coordinate of node
  - **ELEVATION**: Z-coordinate of node
  - **NOTES**: Character string for notations



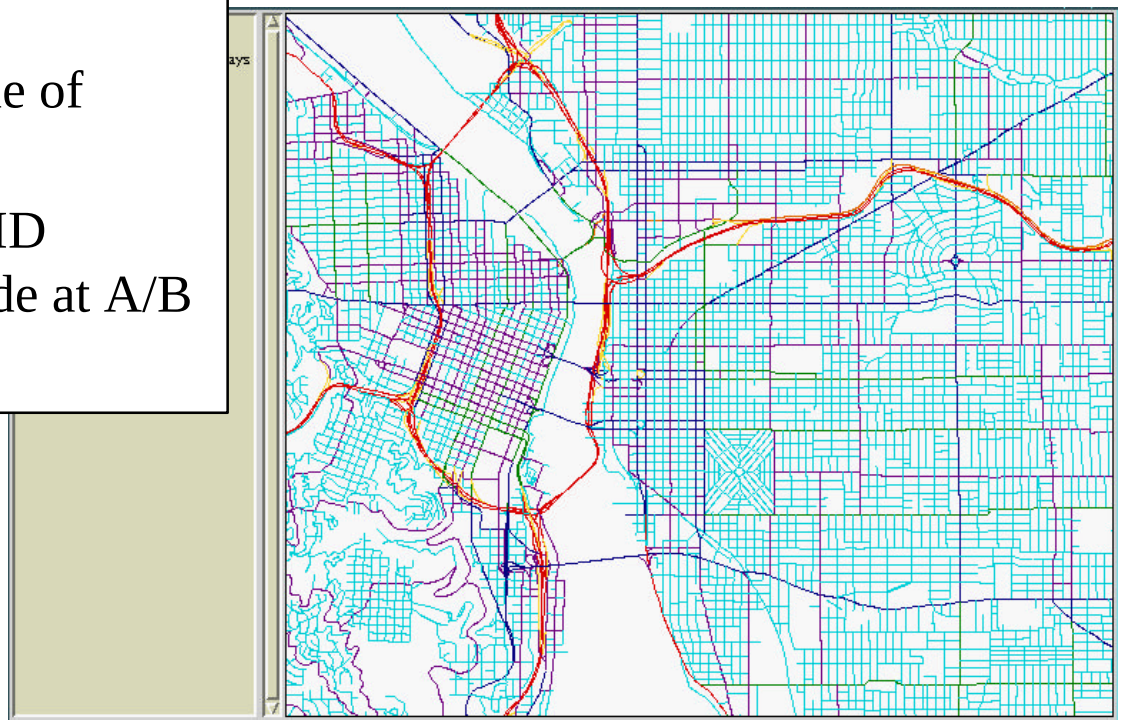
Links

- **Represents roadways, walkways, rail line, etc.**
- **Connected to two nodes**
- **Contains link (lanes, function class) and vehicle (speeds, allowed vehicles) attributes**
- **Can be multi-modal**
- **Intersections represented by link setback from nodes**
- **Portland: ~ 126,000 links**



Links

- **Table fields**
  - **ID**: The ID number of the link
  - **NAME**: The name of street
  - **NODEA/B**: The ID number of the node at A/B



Links

- **Table fields (cont.)**
  - **PERMLANESA/B**: The number of lanes on the link heading toward NODEA/B, not including pocket lanes
  - **LEFTPCKTSA/B**: The number of pocket lanes to the left of the permanent lanes heading toward NODEA/B
  - **RGHTPCKTSA/B**: The number of pocket lanes to the right of the permanent lanes heading toward NODEA/B
  - **TWOWAYTURN:** The toggle for a two-way left-turn lane in the center of the link
  - **LENGTH**: The length of the link (in meters)
  - **GRADE**: The percentage grade from NODEA to NODEB
  - **SETBACKA/B**: The setback distance (in meters) from the center of the intersection at NODEA/B

Links

- **Table fields (cont.)**
  - **CAPACITYA/B**: The total capacity (in vehicles per hour) for the lanes traveling to NODEA/B (*Obsolete Fields*)
  - **SPEEDLMTA/B**: The default speed limit (in meters per second) for vehicles traveling toward NODEA/B
  - **FREESPDA/B**: The default free-flow speed (in meters per second) for vehicles traveling toward NODEA/B
  - **FUNCTCLASS**: The functional class of the link
    - FREEWAY = freeway
    - XPRESSWAY = expressway
    - PRIARTER = primary arterial
    - LOCAL = local street
    - RAMP = freeway ramp
    - WALKWAY = walk only
    - etc.

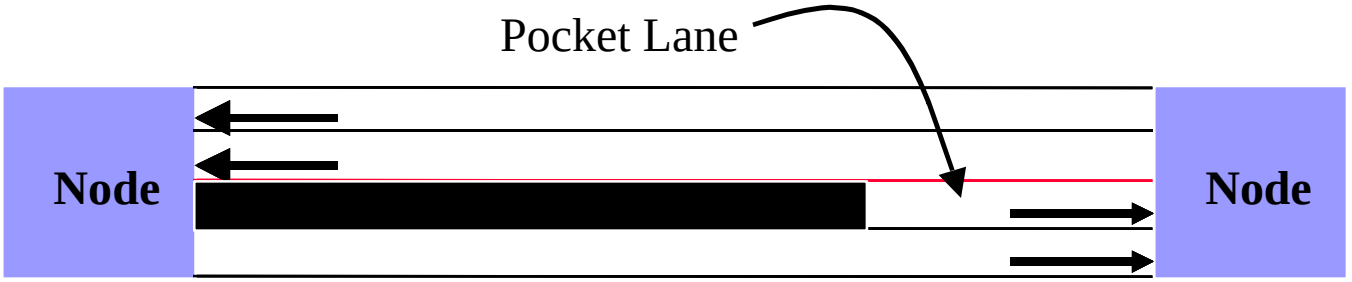
Links

- **Table fields (cont.)**
  - **THRUA/B**: The default through link connected at NODEA/B (*LaneConnectivity)*
  - **COLOR**: The color number for the link (*Obsolete Field*)
  - **VEHICLE**: The vehicle types (modes) allowed for use a link
    - WALK = walking allowed
    - AUTO = private auto
    - TRUCK = motor carrier
    - BICYCLE = bicycle
    - TAXI = paratransit
    - BUS = bus
    - TROLLEY = trolley
    - STREETCAR = streetcar
    - LIGHTRAIL = light rail transit

  - **NOTES**: A character string used for data quality annotations

Pocket Lanes

- **Defined as turn, merge, and pull-out lanes**
- **Is a permanent lane that does not extend the entire length of a link**
- **Portland: ~ 4,400 pocket lanes**

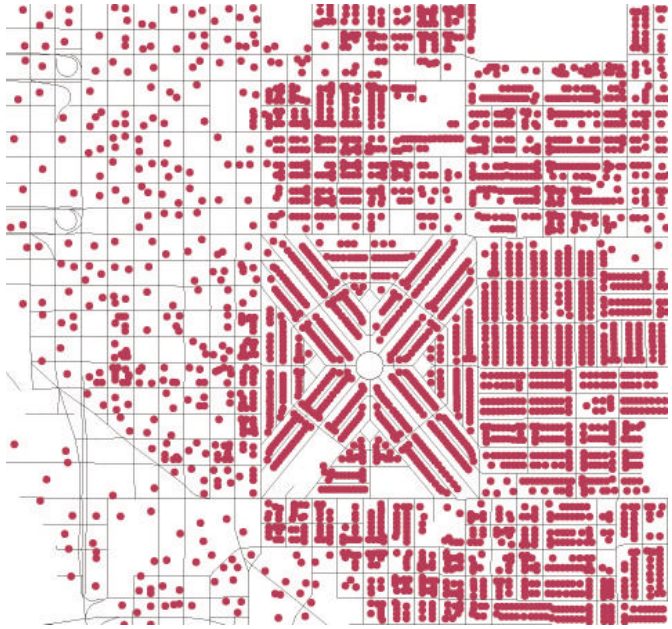


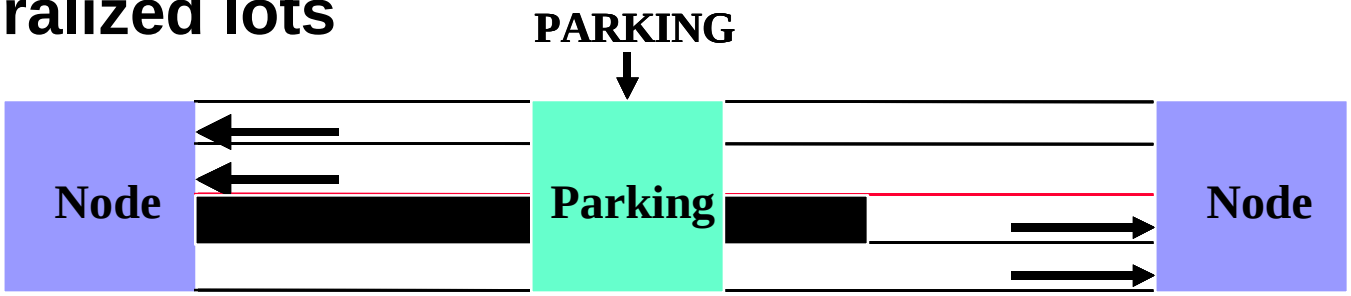
Pocket Lanes

- **Table fields**
  - **ID**: The ID number of the pocket lane
  - **NODE**: The ID number of the node toward which the pocket lane leads
  - **LINK**: The ID number of the link on which the pocket lane lies
  - **OFFSET**: The starting position of the pocket lane, measured (in meters) from NODE (applicable to pullout pockets only)
  - **LANE**: The lane number of the pocket lane
  - **STYLE**: The type of the pocket lane
    - T = turn pocket
    - P = pull-out pocket
    - M = merge pocket
  - **LENGTH**: The length of the pocket lane (in meters)
  - **NOTES**: A character string used for data quality annotations

Parking Locations

- **Vehicles enter/exit links at parking locations**
- **Are bi-directional**
- **Links may have:**
  - None or many parking locations
  - Real or generalized parking
- **Portland: ~ 123,000 generalized lots**





Parking Locations

- **Table fields**
  - **ID**: The ID number of the parking place
  - **NODE**: The ID number of the node toward which vehicles are traveling
  - **LINK**: The ID number of the link on which the parking place lies
  - **OFFSET**: The location of the entrance from the link to the parking place, measured (in meters) from NODE
  - **STYLE**: The type of parking place
    - PRSTR = parallel on street
    - HISTR = head in on street
    - DRVWY = driveway
    - LOT = parking lot
    - BNDRY = network boundary
    - PARKRIDE = park & ride lot

Parking Locations

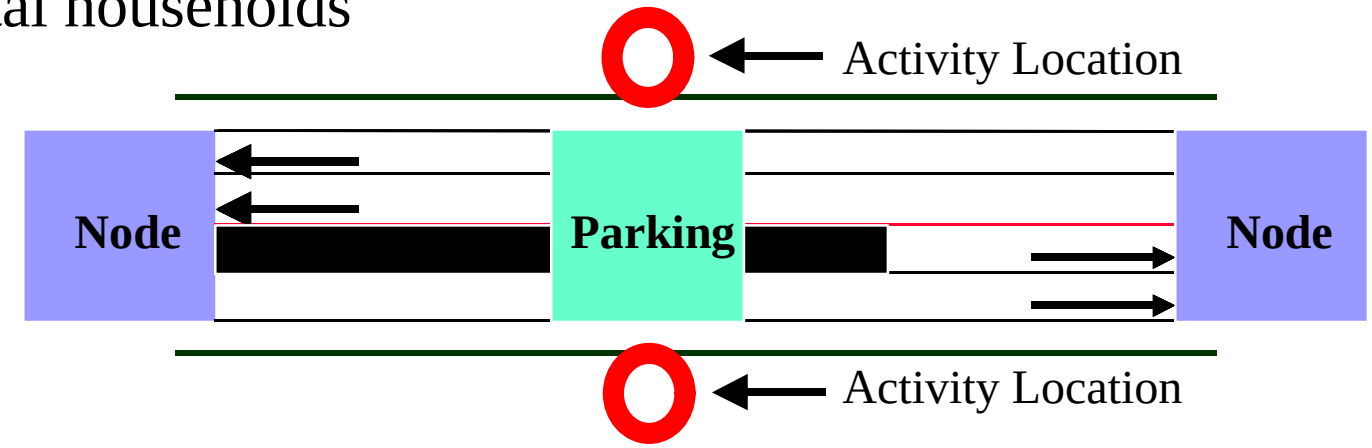
- **Table fields (cont.)**
  - **CAPACITY**: The number of vehicles the parking place can accommodate; zero for unlimited capacity
  - **GENERIC**: A toggle that indicates whether the parking place represents generic parking
  - **VEHICLE**: The type of vehicle(s) allowed to park at the parking place including
    - AUTO = private auto
    - TRUCK = motor carrier
    - BICYCLE = bicycle
    - TAXI = paratransit
    - BUS = bus
    - STREETCAR = streetcar
    - LIGHTRAIL = light-rail transit
    - ANY = any vehicle type

Parking Locations

- **Table fields (cont.)**
  - **STARTTIME**: The starting time for parking (*Currently Ignored*)
  - **ENDTIME**: The ending time for parking (*Currently Ignored*)
  - **NOTES**: A character string used for data quality annotations

Activity Locations

- **Represent a place a household member would travel to and from**
- **Are on a link "layer" (walk, drive)**
- **Have associated "land-use" data:**
  - Census block group
  - Total employees
  - Total households



Activity Locations

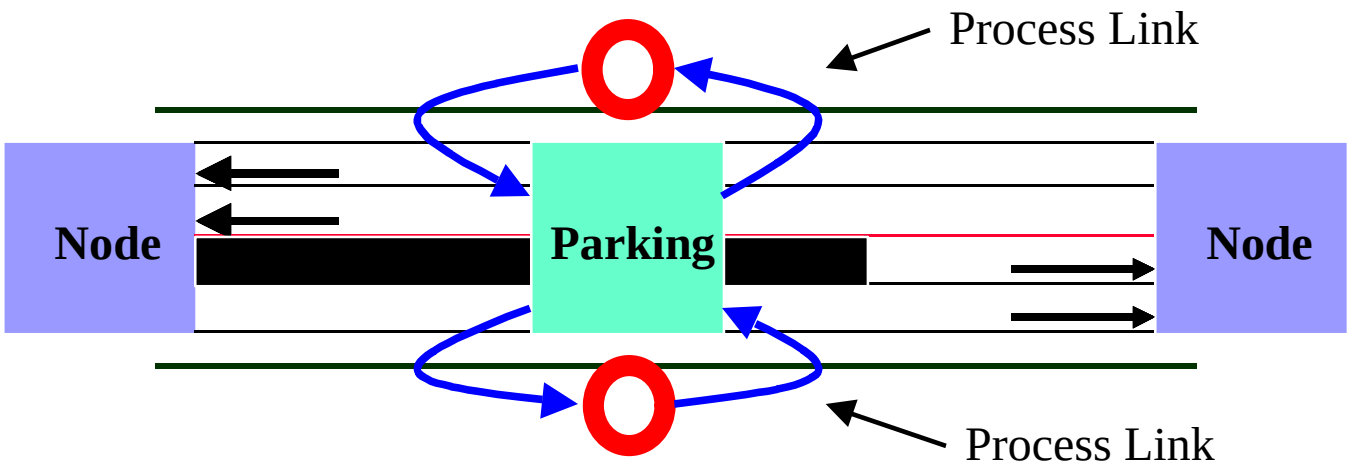
- **Table fields**
  - **ID**: The ID number of the activity location
  - **NODE**: The ID number of the node toward which vehicles are traveling (the location is taken to be on the right side of the street when headed this direction)
  - **LINK**: The ID number of the link on which the activity location lies.
  - **OFFSET**: The location of the entrance from the link to the activity location, which is measured (in meters) from NODE.
  - **LAYER**: The modal "layer" on which the activity location resides
    - AUTO
    - BUS
    - LIGHTRAIL
    - WALK

Activity Locations

- **Table fields (cont.)**
  - **EASTING**: The x-coordinate of NODE
  - **NORTHING**: The y-coordinate of NODE
  - **ELEVATION**: The z-coordinate of NODE
  - **OPTIONAL FIELD(S)**: Up to 20 user-defined fields related to land use
  - **NOTES**: A character string used for data quality annotations

Process Links

- **Allows for traveler movement between:**
  - Parking locations
  - Activity locations
  - Transit stops
- **Are directional**
- **Viewed as walk links**
- **Have associated delays and costs**
- **Portland: 500,000+ process links**



Process Links

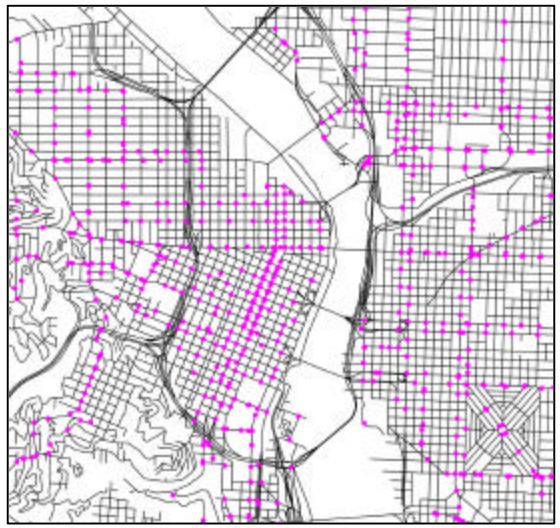
- **Table fields**
  - **ID**: The ID number of the virtual link
  - **FROMID**: The ID number of the accessory from which the virtual link leaves
  - **FROMTYPE**: The type of accessory from which the virtual link leaves
    - ACTIVITY
    - PARKING
    - TRANSIT
  - **TOID**: The ID number of the accessory to which the virtual link leads

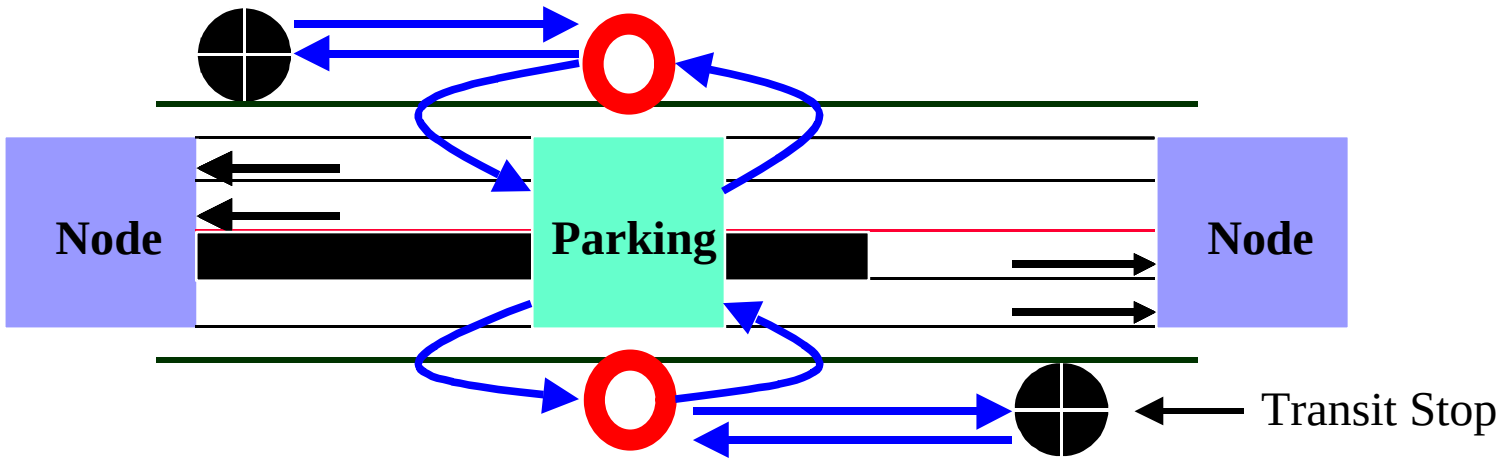
Process Links

- **Table fields (cont.)**
  - **TOTYPE**: The type of accessory to which the virtual link leads
    - ACTIVITY
    - PARKING
    - TRANSIT
  - **DELAY**: The time delay (measured in seconds) incurred when traveling across the virtual link
  - **COST**: The cost (measured in arbitrary units) incurred when traveling across the virtual link
  - **NOTES**: A character string used for data quality annotations

Transit Stops

- **Where passengers board/leave transit vehicles**
- **Multiple transit lines may utilize the same transit stop in their routes**





Transit Stops

- **Can be connected by process links to:**
  - Other transit stops
  - Parking locations
  - Activity locations
- **Portland: ~8,000 transit stops**

Transit Stops

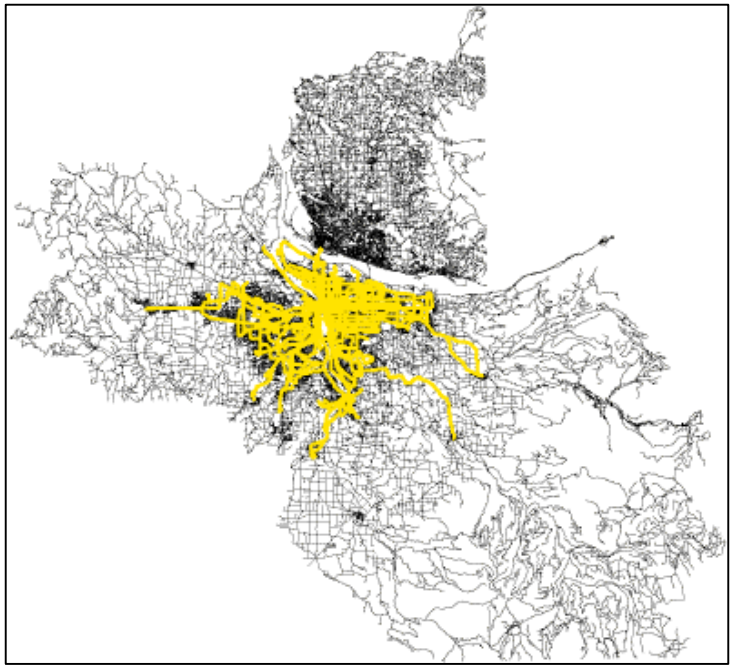
- **Table fields**
  - **ID**: The ID number of the stop
  - **NAME**: The name of the stop
  - **NODE**: The ID number of the node toward which vehicles are traveling
  - **LINK**: The ID number of the link on which the stop takes place
  - **OFFSET**: The location of the stop, which is measured (in meters) from NODE
  - **VEHICLE**: The types of vehicles for which this is a stop
    - BUS = bus
    - TROLLEY = trolley
    - STREETCAR = streetcar
    - LIGHTRAIL = light-rail transit
    - RAPIDRAIL = rail-rapid transit
    - REGIONRAIL = regional rail

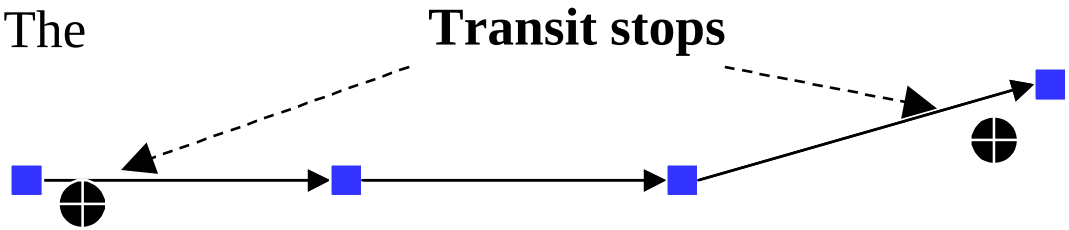
Transit Stops

- **Table fields**
  - **STYLE**: The type of stop
    - STOP = stop (no station)
    - STATION = station
  - **CAPACITY**: The number of vehicles the stop can simultaneously handle (zero for unlimited capacity)
  - **NOTES**: A character string used for data quality annotations

Transit Routes and Schedules

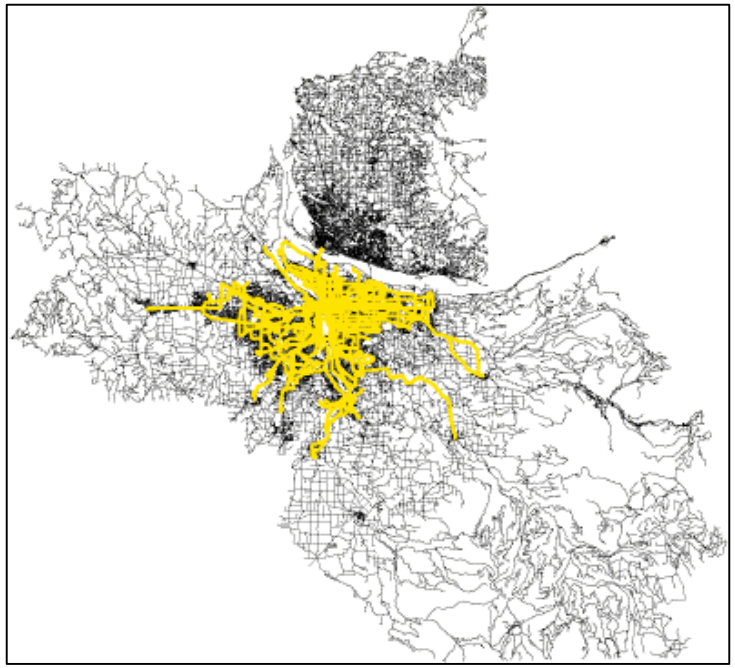
- **Not part of network tables**
- **Schedule file table fields**
  - **TRANSIT ROUTE ID**: A unique identifier for this route
  - **TIME**: The departure time at the stop (seconds past midnight)
  - **TRANSIT STOP ID**: The ID of this transit stop

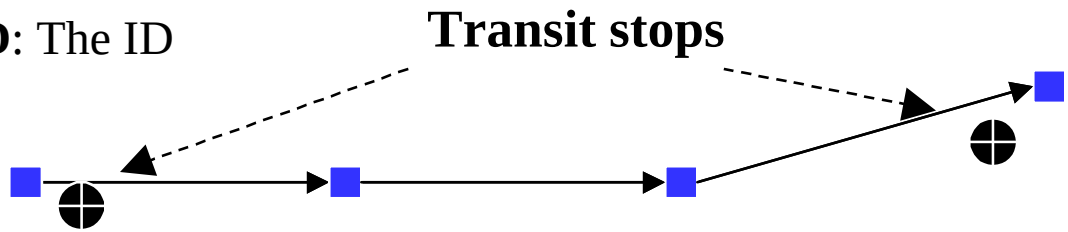




Transit Routes and Schedules

- **Not part of the network tables**
- **Schedule File**
  - Contains the times that a transit vehicle leaves a stop
  - Table fields
    - **TRANSIT ROUTE ID**: A unique identifier for this route
    - **TIME**: The departure time at the stop (seconds past midnight)
    - **TRANSIT STOP ID**: The ID of this transit stop





Transit Routes and Schedules

- **Transit route file**
  - Contains a list of stops in the order that a vehicle travels to them
  - Table fields
    - **TRANSIT ROUTE ID**: A unique identifier for this route
    - **NUMBER OF STOPS**: The number of transit stops to follow
    - **TRANSIT TYPE**: The type of transit vehicle serving this route
      - BUS
      - TROLLEY
      - STREETCAR
      - LIGHTRAIL
      - RAPIDRAIL
      - REGIONALRAIL

    - **TRANSIT STOP ID**: The ID of the transit stop
    - **LINK ID**: The ID of the link on which the transit stop resides

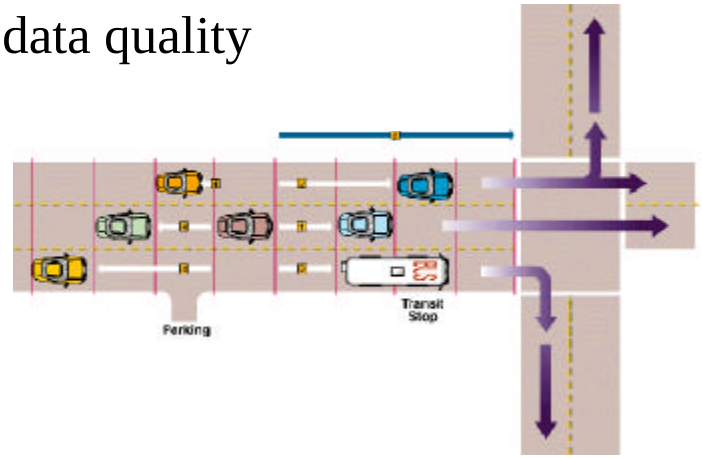
Transit Routes and Schedules

- Transit route table fields (cont.)
  - **NODE ID**: The ID of the node toward which the vehicle is heading
  - **TRANSIT ZONE**: The ID of the zone in which the transit stop is located (or 0 if the cost is not zone based)

- **Transit Driver Plans contain a list of nodes in order of the route**
- **Portland:**
  - ~ 550 bus routes
  - 11 light rail routes
  - ~ 8000 transit runs
  - ~ 440,000 stop times

Connectivity

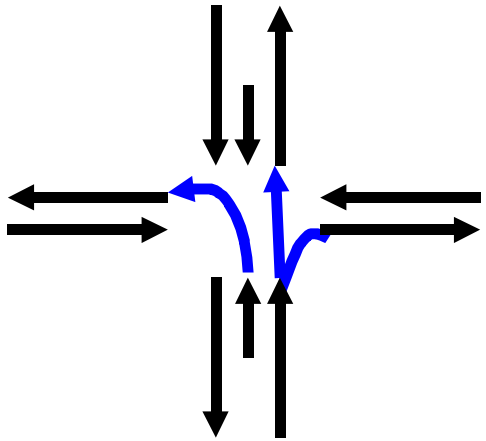
- **Specifies the movements allowed at a node**
- **Table fields**
  - **NODE**: The ID number of the node
  - **INLINK**: The ID number of the incoming link
  - **INLANE**: The lane number of the incoming lane
  - **OUTLINK**: The ID number of the outgoing link
  - **OUTLANE**: The lane number of the outgoing lane
  - **NOTES**: A character string used for data quality annotations



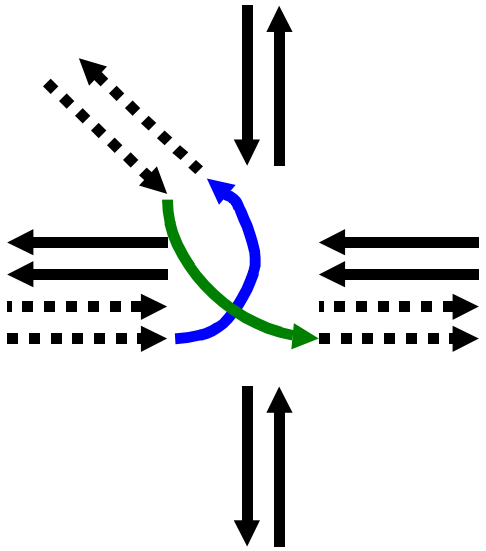
Connectivity

- **Examples**

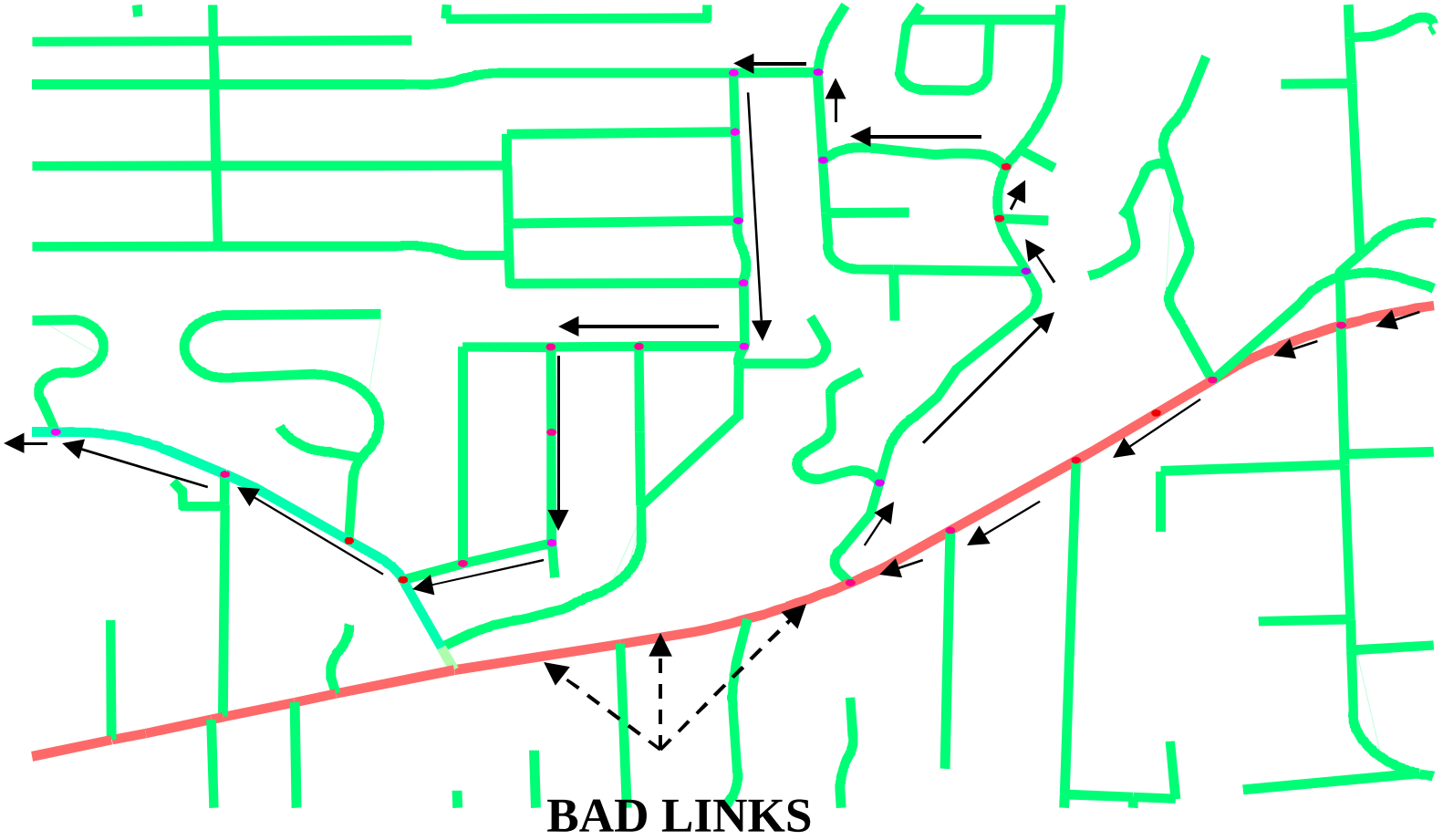
Signalized intersection with turn pocket



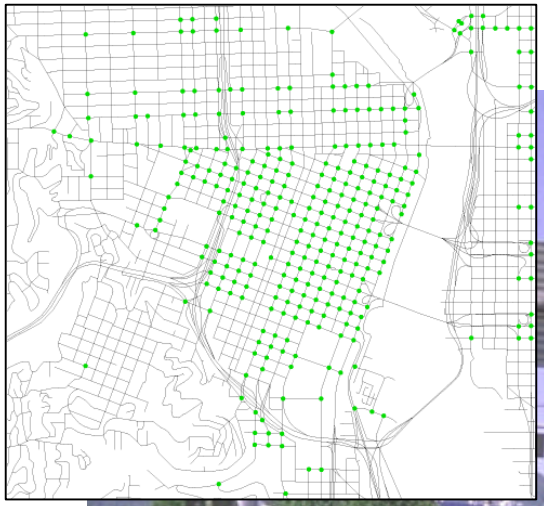
Light rail intersection with network



Connectivity: Bad Route

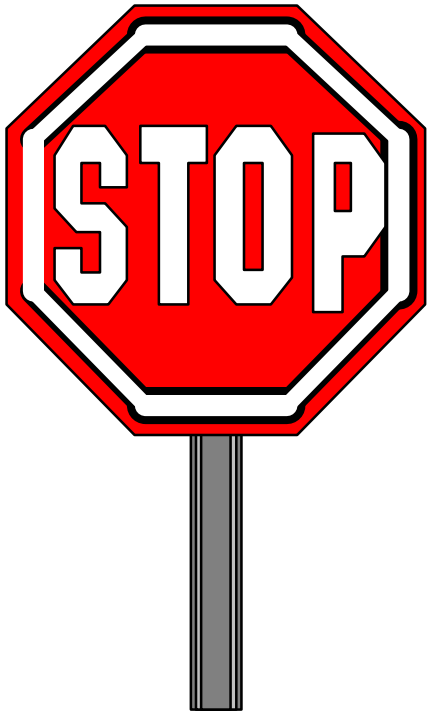


Signals and Phases



- **Tool available to generate generic signals**
- **Can use actual data to create tables**
- **Other tables: Detector and Signal Coordinator**

Unsignalized Nodes



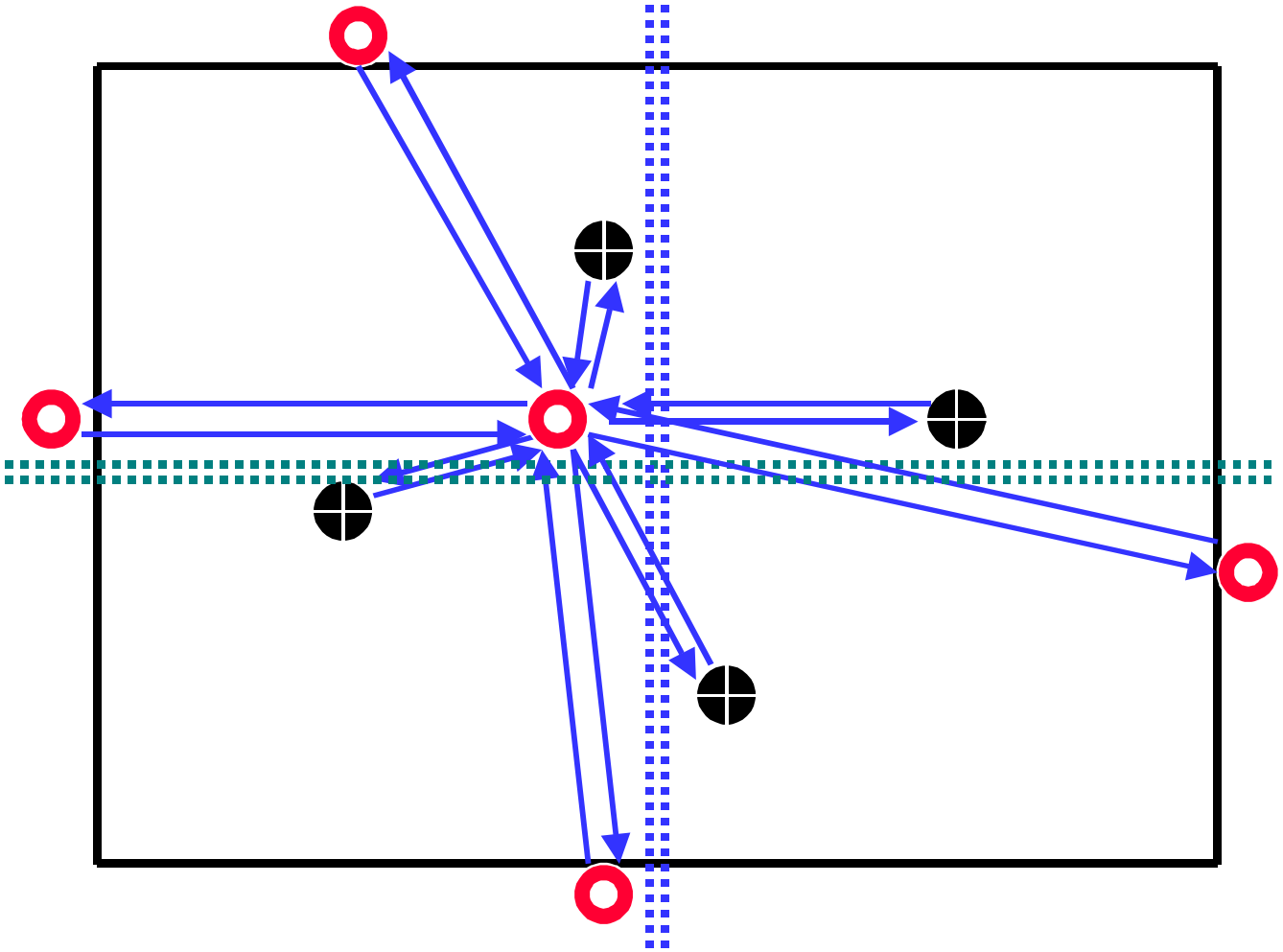
- **Nodes included have:**
  - Stop sign or flashing red
  - Yield sign or flashing yellow
  - Nothing
- **Table can have real or generated data**
- **Tool provided to assign signs to the network**

Data Preparation

- **Automated tools**
  - Traffic controls
  - Validation tool
  - Lane connectivity
- **GIS tools**
- **Custom codes**
- **Aerial photos**

Subway Example

- Two lines (N-S, E-W)
- Toll Stations
- Underground, connected to outside streets



Activity Location

Transit Stop

Process

Drive/Walk

Transit

Transit

Conclusion

- **Other tables:**
  - Lane use
  - Barrier
  - Turn Prohibition *(Currently ignored)*
  - Study Area Link
- **Web site: http://transims.tsasa.lanl.gov/**
  - Contains all documentation
  - Can post questions on a bulletin board